(No Model.) 2 Sheets—Sheet 1.

A. SHEDLOCK.

WICKLESS OIL LAMP.

No. 458,814. Patented Sept. 1, 1891.

Fig. 1.

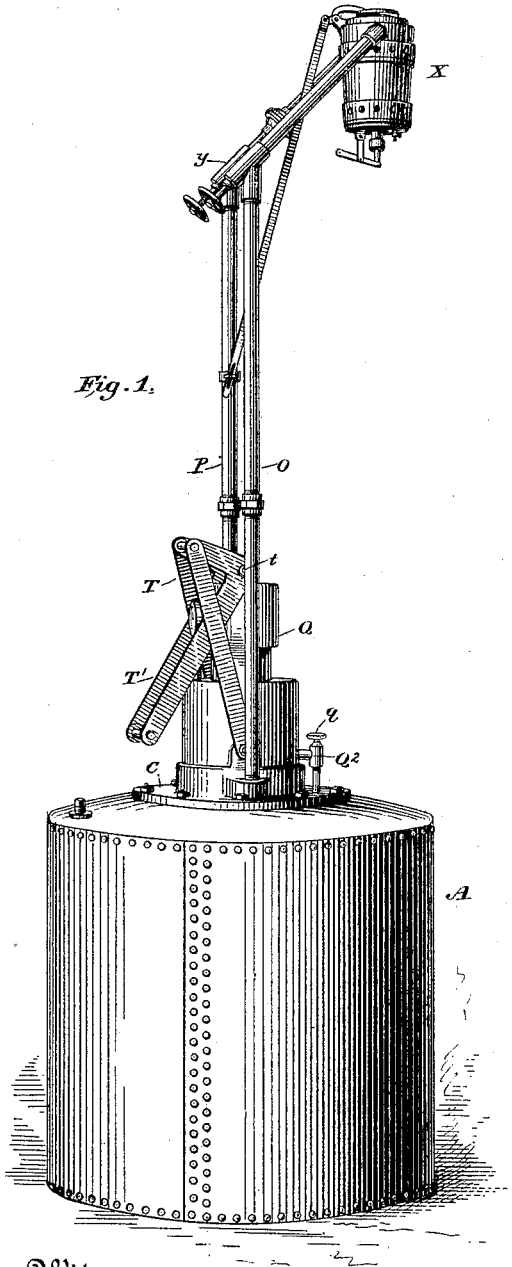
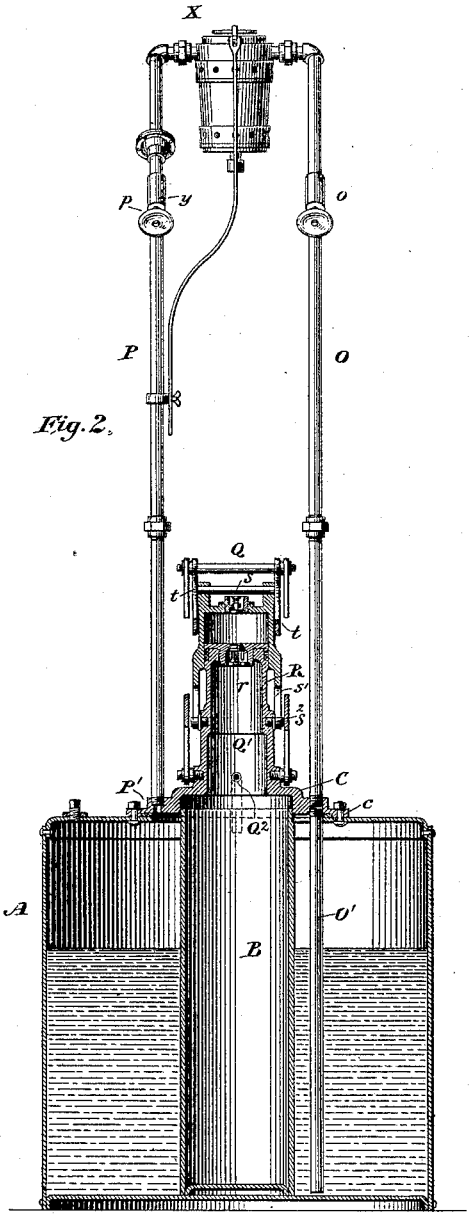


Fig. 2.



Witnesses
Geo. W. Breck.
Henry W. Lloyd

Inventor
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By his Attorneys
Baldwin, Dawson & Wright

(No Model.) 2 Sheets—Sheet 2.

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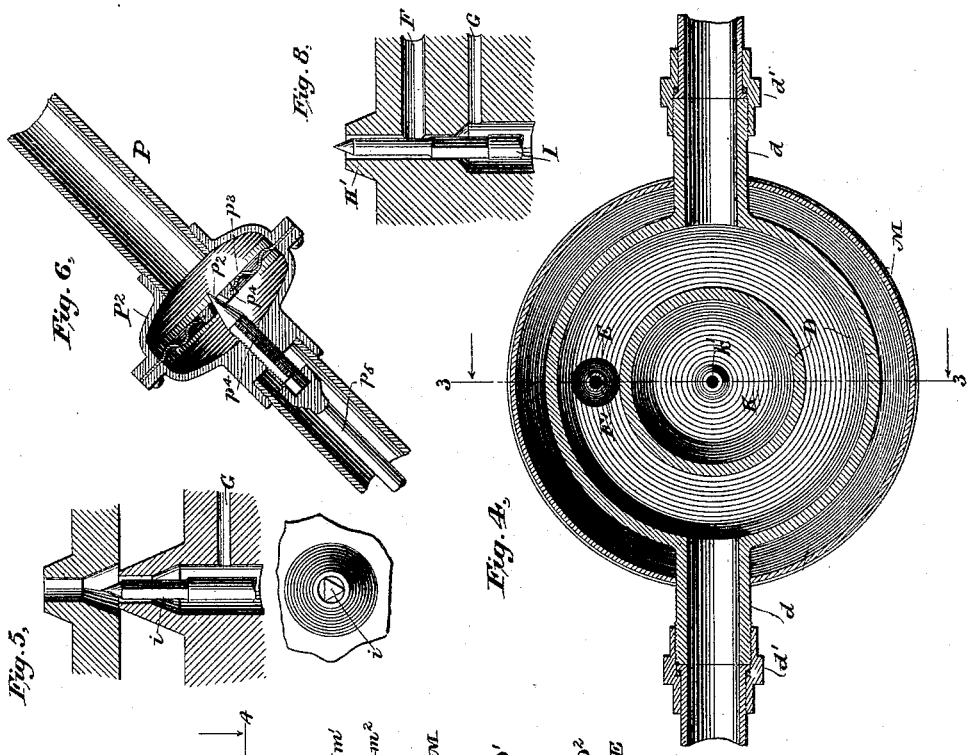

Fig. 6.

Fig. 8.

Fig. 5.

Fig. 4.

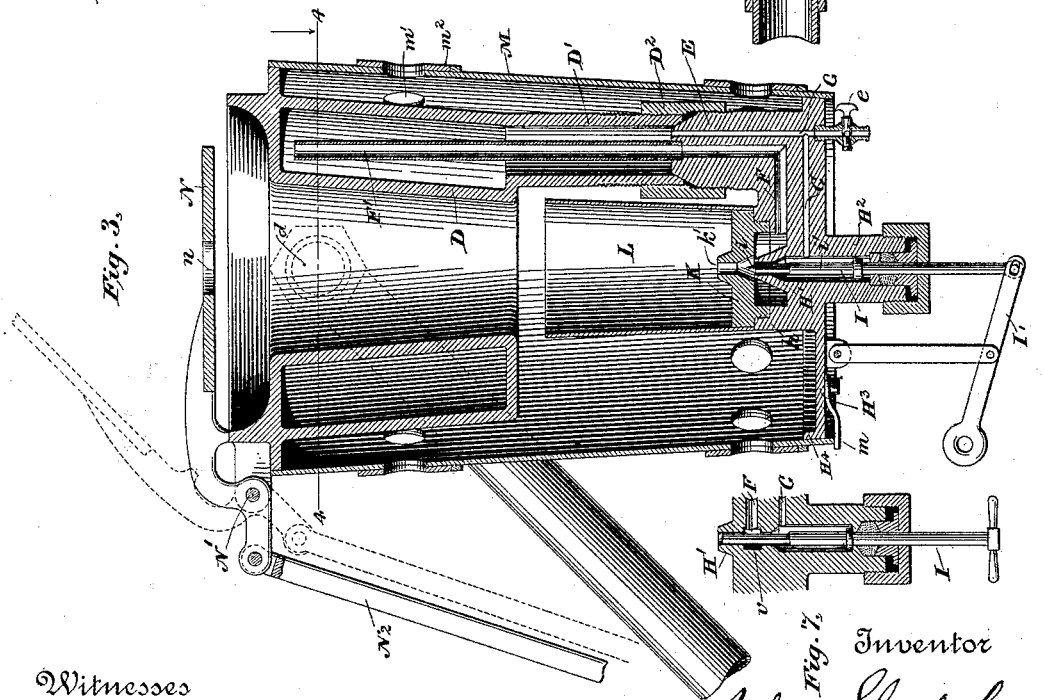

Fig. 3.

Fig. 7.

Witnesses

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UNITED STATES PATENT OFFICE.

ALFRED SHEDLOCK, OF JERSEY CITY, NEW JERSEY.

WICKLESS OIL-LAMP.

SPECIFICATION forming part of Letters Patent No. 458,814, dated September 1, 1891.

Application filed August 19, 1890. Serial No. 362,393. (No model.)

To all whom it may concern:

Be it known that I, ALFRED SHEDLOCK, a citizen of the United States, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Wickless Oil-Lamps, of which the following is a specification.

My invention more especially relates to a lamp adapted to burn hydrocarbon oils of variable density, in which the oil supplied to the burner is subjected to the direct action of the flame of the lamp, whereby some of the lighter constituents of the oil are vaporized, which vapor is discharged under its own pressure at the burner to spray the oil at the moment of its ignition.

The objects of my invention are to secure a compact, simple, and efficient wickless oil-burning lamp adapted to consume the heavier constituents of the oil as well as the lighter ones, which ends I attain by certain novel constructions, combinations, and organizations of instrumentalities hereinafter specified.

Unless otherwise specified the apparatus is of usual construction.

In the accompanying drawings, which show a convenient arrangement of apparatus embodying my improvements in the best way now known to me, Figure 1 is a perspective view thereof; and Fig. 2, a view, partly in elevation and partly in vertical section. Fig. 3 represents a vertical section through the generator and burner and appurtenant parts on the line 3 3 of Fig. 4 and on an enlarged scale; Fig. 4, a horizontal section on the line 4 4 of Fig. 3; Fig. 5, an enlarged detailed sectional view and plan of the burner-nozzle or spraying device; Fig. 6, a longitudinal central section through the air-supply pipe and its automatic valve-governor. Figs. 7 and 8 show sections similar to Fig. 5 of modified forms of spraying devices.

The apparatus consists mainly of two portions, the feeding and the heating apparatus. The former is shown as consisting of an oil-tank A, constituting the base of the apparatus, preferably cylindrical in form and provided with a central cylindrical air-receiving chamber B, the upper portion of which protrudes through the cover of the tank and screws into a flanged base-plate C, firmly secured upon the tank by bolts *c*, passing through flanges on the plate. Air-compressing apparatus is shown as mounted upon this base-plate.

The particular air-compressor herein shown forms the subject-matter of another application, Serial No. 362,392, filed simultaneously herewith, and will therefore need brief description only.

A compression-chamber Q′ is shown as made integral with the base-plate and with a tubular piston R, constituting an extension of this chamber. The outer head of this piston is closed by a check-valve *r*. A cup-shaped cylinder Q reciprocates over the piston R, its closed end being provided with an air-inlet valve *s*. Longitudinally-slotted arms *s′* on the cylinder Q work over guide-lugs s^2, projecting from the sides of the piston or compressing-chamber. The cylinder Q is reciprocated by links T, pivoted at one end on each side of the compression-chamber near the base-plate and at the other connected with the shorter arms of elbow-levers T′, rocking on pivots *t* on lugs on the cylinder. The outward movement of the free ends of the elbow-levers forces the links T inwardly into line with their pivots, thus moving the cylinder inward upon the piston and compressing the air therein. A continuance of the outward movement of the levers or a reversal of their former movement retracts the cylinder and permits air to enter therein, which is forced through the check-valve at the next stroke, and so on. A pipe Q^2 connects the compressing-chamber Q′ with the top of the tank A, and is provided with a pressure-controlling valve *q*. An oil-pipe O O′ extends upward from near the bottom of the tank A a suitable distance and supports one side of the burner X. A similar air-pipe P P′ connects the top of the tank with the opposite side of the burner. The upper portions of the pipes O and P are shown as bent at an angle and as provided with couplings *y* and valves *o p* therein.

The burner consists of an annular chamber-retort or vapor-generator D, having a longitudinal central opening therethrough, which constitutes in part the combustion-chamber of the lamp. The pipes O P communicate with this annular chamber through project-

ing pipes d and union-joints d'. A pipe extension or well D′ depends from one side of the chamber D and through a band, sleeve, or coupling D^2 is secured upon a hub E, this construction being adopted to avoid a multiplicity of joints, which are objectionable as tending to leak at this point, owing to the frequent and rapid expansions and contractions of the generator. The hub and well D′ are both tapered to fit snugly at their point of intersection and externally screw-threaded, one having a longer thread of a finer pitch than the other. The enveloping sleeve D^2 is correspondingly threaded, so that when screwed upon these parts it forces them together and holds them securely. The hub E is shown as formed on one side of a casting or bracket, in which are formed two ducts or passages from the well to the central vertical nozzle H′. A pipe F′, extending from near the top of the annular chamber or generator D down through the well and hub E, connects with a passage F, leading to the nozzle, to which it serves to conduct vapor generated in the annular chamber or retort D. A smaller duct or passage G in this hub connects the bottom of the well with the nozzle and serves to conduct oil thereto. A cock e in line with the vertical portion of this passage affords means of cleaning it out in case of obstruction. As will be seen, the organization is such that the oil-nozzle lies concentrically beneath the combustion-chamber formed by the central opening through the generator D. A rod I, carrying on its inner end a needle-valve i, moves endwise through a packed joint on the end of an extension or lug H^2 of the bracket or casting. The upper portion of the part H^2 is contracted to form the oil-nozzle H′. The oil-duct G enters the passage in which the needle-valve works at a point below the nozzle, while the vapor-duct F discharges into an annular chamber surrounding the nozzle itself above the oil-duct. The top of this chamber consists of a cap K, screwing into a flange surrounding the nozzle H′, which terminates immediately beneath but concentrically with a similar nozzle k', formed in the plate K. These parts last described make up the spraying device. I may use concentric nozzles; but other forms of spraying devices may be employed—such, for instance, as shown in Figs. 7 and 8, which I prefer. As a consequence of this organization, air or vapor is discharged concentrically around the oil emerging from the nozzle H′ and thoroughly mingled therewith, the mingled oil and air or vapor being discharged in the form of spray through the nozzle k'. The casting containing these ducts and nozzles has a circular base H^3. The rod I of the needle-valve is pin-jointed to a lever I′, pivoted to a swinging link depending from the under side of the casting H^3. By this means the rod I may be adjusted or reciprocated longitudinally in its channel and in the nozzles H′ and k'. The inner end i of this rod is pointed, while its sides are flattened to form ducts or passage-ways i' for the passage of the oil. Fig. 5 shows this rod or needle valve as triangular in cross-section. The point of the rod is so shaped as not only to pass through the nozzle H′, but into the inner nozzle k', thus regulating the flow of oil, air, or vapor through both nozzles. The outer end of the rod is circular and of a diameter that corresponds with the discharge-opening of the above-mentioned nozzle, and the lower portion of the needle is provided with a button or enlargement corresponding with the bore of the passage in which its works, by which means the needle-valve not only works accurately, but may be used to clear the openings of any obstructing matter.

A cylindrical or upwardly-flaring shield or tunnel L, surrounding the nozzle and extending nearly up to the bottom of the generator, may be used, if preferred, although not essential to the operation of the device. This tunnel is concentric with the longitudinal central opening in the generator, which constitutes a combustion-chamber, and which is also shown as flaring outwardly to afford more room for the expanding gases.

A circular casing or shell M rests upon a flange H^4 of the base H^3, fitting snugly thereover and being held in place by a suitable fastening—such as a turn-button m—to admit of its ready removal or replacement. The upper edge of this casing fits over the flange of the upper part of the generator. The base H^3 is somewhat smaller than the top of the generator and the casing is correspondingly flared outward to conform to the other parts of the apparatus. A series of apertures is formed horizontally around the casing both near its top and near its bottom. Bands m^2, provided with a corresponding series of apertures m', surround these apertures and turns axially on the casing to act as valves or dampers to regulate the volume of air passing through the apertures.

A choking-plate N, corresponding in shape with the top of the combustion-chamber, but of somewhat smaller diameter and having a central opening n, is mounted on a lever rocking on a pivot N′ near the edge of the combustion-chamber. A link N^2, pin-jointed with this lever, extends within convenient reach of the operator, and may be held in any desired position by means of a clamp-screw mounted on one of the supporting-pipes. (See Fig. 2.)

A valve-chamber P^2 in the air-pipe P is shown in Fig. 6 as provided with a transverse diaphragm p^3, clamped at its edges between the sections of the valve-chamber and provided with a central opening having a valve-seat p^2, in which a needle-valve provided with a conical point reciprocates longitudinally. The needle is provided with longitudinal channels p^4 for the passage of compressed air at all times, while its valve-rod p^5 is connected with the usual hand-wheel p.

The following is a description of the opera-

tion of the apparatus: The tank A is filled with oil nearly to its top, leaving a space there for the compressed air. The air compressed by the pump in the receiver passes through the reducing-valve q into the upper part of the tank and acts on the surface of the oil. The valve o, of ordinary construction, being opened oil rises from the tank through the pipe O and is discharged into the generator. The valve p being also opened at the same time, air is forced through the pipe P into the opposite side of the generator. Oil flows through the well D′ and duct G out through the nozzle H′, while at the same time air passes from the upper part of the generator down through the pipe F′ F and nozzle k', where it is mingled with the oil escaping from the nozzle H′ and blows it into spray, which is then ignited. This heats the generator and vaporizes the lighter portion of the oil therein, which vapor mixes with the air and passes down through the pipe and nozzles. The generator soon becomes so hot that if the oil has a sufficient portion of the lighter constituents they will vaporize so rapidly as to generate the necessary pressure to spray the oil at the discharge-nozzles, in which case the air-supply may be cut off and the apparatus worked with the vapor and oil alone. The flame rushes up through the combustion-chamber and is discharged through the annular opening between the top of the combustion-chamber and the choking-plate N and through the central opening n in said plate. When in its lowest position this plate rests in the attitude shown by the full lines in Fig. 3, where it serves to prevent the escape of the flame, and thus heat the generator to a greater degree. When the apparatus is in full operation, this plate may be raised out of the way, as shown in dotted lines in this figure, in which case the flame will rush out in the form of a torch and give a very brilliant light. With very light oils the vapor will be generated with sufficient rapidity not to require the use of a choking-plate in starting the apparatus. It is of course essential to the operation of the apparatus that the oil in the tank should be under sufficient pressure to force it into the generator in proper quantity. It is also essential that there should be at all times a sufficient pressure of air or vapor in the generator to force air or vapor and oil through the nozzles to the burner. Ordinarily, as before remarked, vapor will be generated in sufficient quantities for this purpose. I provide, however, for a deficiency of pressure at this point in the following manner: After starting the burner the air-supply is cut off by closing the valve, as above described. As long as the pressure of the vapor in the generator is sufficient to spray the oil, the back-pressure on the diaphragm p^3 is sufficient to keep it pressed against the needle-valve p^2 and prevent the passage of air to the generator. When, however, the pressure in the generator becomes insufficient properly to spray the oil, the diaphragm p^3 yields sufficiently to open the valve and allow compressed air to rush into the generator and spray the oil. The initial heating of the generator may be accelerated by the ignition of oil or alcohol poured into the base H^3 of the burner, as usual.

Figs. 7 and 8 show modifications of the apparatus, in which one of the nozzles is dispensed with. Fig. 7 shows the bore of the nozzle H′ elongated and provided with an annular enlargement or chamber v around the three-sided portion of the valve-rod I, the oil being introduced into the chamber in which the valve works below the chamber v. This organization permits both air and oil to pass up along the flat sides of the rod, which need not be pointed. The rod is adapted both to move longitudinally and turn axially to clear the nozzle and chambers of any obstruction. Fig. 8 shows the upper part of the valve-rod as rounded and of less diameter than the bore of the nozzle. The air-duct F opens against the round portion of the rod, while the portion between this duct and the oil-duct is flattened, so as to allow oil to pass lengthwise of the rod to mingle with the vapor, as before.

I am thus by my improvements enabled at all times to secure the feeding of the oil to the burner in properly-regulated quantities to spray it thoroughly and to mix it intimately with the proper quantity of air or vapor to insure effective combustion and automatically to compensate any deficiency of pressure in the generating-chamber by compressed air, and am thus able advantageously to use oils of different grades. With very light refined oils vapor is generated quickly and readily in abundant quantity, and the oil may be of such a character that when supplied to the vapor-generator in proper quantity all of it will be vaporized, and in that event the apparatus operates as a vapor-lamp.

Having thus fully described the construction, organization, and operation of my improved wickless oil-lamp, what I claim therein as new and as of my own invention is—

1. The combination, substantially as hereinbefore set forth, of an oil-tank, an air-receiver therein, a base-plate connecting the top of the tank with the top of the receiver, an air-compressing pump carried by this base-plate, a pipe connecting the pump and the tank, a pressure-controlling valve in this pipe, an oil-pipe terminating near the bottom of the tank, and an air-pipe terminating near its top.

2. The combination, substantially as hereinbefore set forth, of an oil-tank, an air-receiver therein, an air-compressing pump mounted upon and opening directly into the receiver, a pipe directly connecting the pump and the tank, a pressure-controlling valve in said pipe, a burner, an oil-pipe connecting the burner and the tank, and a separate air-pipe also connecting the burner and the tank.

3. The combination, substantially as hereinbefore set forth, of an oil tank, an air-re-

ceiver, a pipe connecting the receiver and the tank, an oil-pipe projecting from the tank, a separate air-pipe likewise projecting therefrom, a burner, its combustion-chamber, pipes connecting the burner with the air and the oil pipes, and independent valves in the air and the oil pipes.

4. The combination, substantially as hereinbefore set forth, of an annular generator having an unobstructed longitudinal central opening constituting a combustion-chamber, a spraying device, separate oil and vapor ducts connecting the generator and the spraying device, and a cover or choking plate hinged to one side of the generator, so as to close the mouth of the combustion-chamber or swing entirely clear of it, as desired.

5. The combination, substantially as hereinbefore set forth, of an annular generator inclosing a combustion-chamber, a spraying device, an air or vapor duct connecting the top of the generator with the spraying device, and an oil-duct connecting the bottom of the generator with the spraying device.

6. The combination, substantially as hereinbefore set forth, of an annular generator inclosing a combustion-chamber, a spraying device, an air or vapor duct connecting the top of the generator with the spraying device, an oil-duct connecting the bottom of the generator with the spraying device, a valve controlling both ducts, a base-plate, and a casing connecting the base-plate and the generator.

7. The combination, substantially as hereinbefore set forth, of an annular generator inclosing a combustion-chamber, a spraying device, separate oil and vapor ducts connecting the generator and the spraying device, a single valve controlling both ducts, and a tunnel interposed between the spraying device and the generator to conduct the flame to the combustion-chamber.

8. The combination, substantially as hereinbefore set forth, of an annular generator having a combustion-chamber, a spraying device, separate oil and vapor ducts connecting the generator and the spraying device, a casing inclosing the generator and the spraying device and having air-openings therein, and valves or dampers regulating said openings to control the air-supply admitted to the combustion-chamber.

9. The combination, substantially as hereinbefore set forth, of an annular generator, a spraying device, oil and vapor ducts connecting the generator and the spraying device, a flanged or cup-shaped base-plate, and a casing connecting the base-plate and the generator, whereby the former can be used as an ignition-chamber to heat the spraying device, the ducts, and the generator.

10. In a wickless lamp, the combination, substantially as set forth, of a spraying device, a generator surrounding the flame from the spraying device, oil and vapor ducts connecting the generator and spraying device, an oil-tank, and a pipe or duct connecting the tank and generator.

11. The combination, substantially as hereinbefore set forth, of an oil-tank, the generator, an oil-pipe connecting the lower part of the tank with the generator, an air-pipe connecting the upper part of the tank with the generator, a spraying device, an air or vapor duct connecting the generator and spraying device, and an oil-duct connecting the generator and spraying device.

12. The combination, substantially as hereinbefore set forth, of a vapor-generator, an oil-inlet pipe, an air-inlet pipe, a yielding diaphragm in the air-inlet pipe, having a valve-seat and an air-valve co-operating therewith, whereby the valve is automatically opened or closed by variations of pressure in the air-pipe, a spraying device, and an air or vapor duct and an oil-duct leading from the generator to the spraying device.

13. The combination, substantially as hereinbefore set forth, of a generator, its air-inlet pipe, a yielding diaphragm therein having a valve-seat and a valve adjustable relatively to said seat, whereby it may be controlled either automatically or by hand, an oil-inlet to the generator, a spraying device, and air or vapor and oil ducts leading from the generator to the spraying device.

14. The combination, substantially as hereinbefore set forth, of a generator, a spraying device connected therewith, means for supplying oil to the generator and spraying device, a compressed-air pipe leading to the generator, and an automatic regulating-valve in the air-pipe, which admits air to the generator when the vapor-pressure therein fails.

15. The combination, substantially as hereinbefore set forth, of a generator, its oil-inlet, its air-inlet, an automatic regulating-valve in the air-inlet, a spraying device, an air or vapor duct connecting the generator and the spraying device, and an oil-duct connecting the generator and the spraying device, whereby the air-valve admits air to force the oil to the spraying device when the vapor-pressure fails.

16. The combination, substantially as hereinbefore set forth, of an annular generator, its pendent leg or oil-well, a bracket, a spraying device therein, a cone-shaped hub thereon fitting into the oil-well, oil and air ducts passing through the well and bracket, and a screw-coupling uniting the well and hub to make a close joint, while permitting of ready removal or replacement of the parts.

17. The combination, substantially as set forth, of a bracket or base-plate, oil and air or vapor ducts therein, a valve-chamber into which both ducts lead and from the orifice of which oil is sprayed, and a rod or needle valve moving transversely across and controlling both ducts.

18. The combination, substantially as set forth, of a burner-nozzle, oil and air or vapor

inlets leading into the bore of the nozzle, a rod arranged in said bore, the upper part of the rod being reduced, so that the air or vapor and the oil entering the bore may pass along the reduced part of the rod to the discharge-orifice of the nozzle, and the lower part of the rod being of a diameter to fit the bore, and means for moving the rod endwise in the bore.

19. The combination, substantially as set forth, of a nozzle, air or vapor and oil inlets leading into the bore of the nozzle, a rod arranged in said bore, the upper portion of the rod having its side flattened, so that the air or vapor and oil entering the bore at both inlets may pass along the upper portion of the rod to the discharge-orifice of the nozzle, and the lower portion of the rod being of a diameter to fit said bore, and means for moving the rod endwise and turning it in the bore.

In testimony whereof I have hereunto subscribed my name.

ALFRED SHEDLOCK.

Witnesses:
FRANK S. OBER,
EDWARD C. DAVIDSON.